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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/744,129	06/21/2001	Donald Smith	9555.109USWO	3012
23552	7590	11/15/2004	EXAMINER	
MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903			CLARDY, S	
			ART UNIT	PAPER NUMBER
			1616	

DATE MAILED: 11/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/744,129

**Applicant(s)**

SMITH ET AL.

**Examiner**

S. Mark Clardy

**Art Unit**

1616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21, 26-32 and 35-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-21, 35 and 36 is/are allowed.
- 6) ☒ Claim(s) 1-16, 26-32 and 37-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

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Claims 1-21, 26-32, and 35-41 are pending in this application for which a request for continued examination (RCE) has been filed, and which had been originally filed under 35 USC 371 as the national stage of international application PCT/CA99/00666, filed July 21, 1999.

Applicants' claims are drawn to methods of using lipochitooligosaccharides (LCOs) as plant growth regulators (PGRs) by applying:

- I. LCOs to seeds, seedlings, or plants in order to:
  - a) enhance seed germination, seedling emergence (claims 1, 5-16)
  - b) enhance seed germination, seedling emergence, or growth of non-legume plants (claims 2-4)
  - c) break dormancy of seeds, tubers, or roots (claims 17-21);
- II. LCO expressing rhizobial strains to seeds, seedlings, plants in order to:
  - a) enhance seed germination, or seedling emergence (claims 26, 30-32, 37-41)
  - b) enhance seed germination, seedling emergence, or growth of non-legume plants (claims 27-29)
  - c) break dormancy of seeds, tubers, or roots (claims 35, 36).

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9 and 13-15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicants are requested to correct the following errors in these claims:

Claim 9, line 1: "claim I" should read -- claim 1 --.

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Claims 13, 14, 15, line 2: "0<sup>[xx]</sup> M" should read -- 10<sup>[xx]</sup> M --.

Claims 17-21, 35, and 36 are allowed. No prior art reference, or reasonable combination of references, teaches methods of using LCOs as dormancy breaking agents for dormant seeds, tubers, or roots.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-16, 26-32, and 37-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Spaink<sup>1</sup>, Stacey et al (US 5,175,149), Stokkermans et al<sup>2</sup>, Schlaman et al<sup>3</sup>, and Röhrig et al<sup>4</sup>.

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<sup>1</sup> Spaink, Herman P. "Regulation of Plant Morphogenesis by Lipo-Chitin Oligosaccharides". *Critical Reviews in Plant Sciences*. 15(5&6):559-582. 1996.

<sup>2</sup> Stokkermans et al. "Structural Requirements of Synthetic and Natural Product Lipo-Chitin Oligosaccharides for Induction of Nodule Primordia on *Glycine soja*". *Plant Physiology*. 108:1587-1595. 1995.

<sup>3</sup> Schlaman et al. "Chitin oligosaccharides can induce cortical cell division in roots of *Vicia sativa* when delivered by ballistic microtargeting". *Development*. 124: 4887-4895. 1997.

<sup>4</sup> Röhrig et al. "Growth of Tobacco Protoplasts Stimulated by Synthetic Lipo-Chitooligosaccharides". *Science*. 269:841-843. 1995.

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Spaink teaches the LCOs were known class of signal molecules (p. 560) which are produced by rhizobia, and known to cause formation of root nodules in leguminous plants (abstract).

Stacey et al, again, teaches that LCOs are plant hormones which are known to induce root hair curling and root nodulation in leguminous plant roots (abstract) at concentrations of  $10^{-12}$  M to about  $10^{-3}$  M (col 2, lines 33-46, and Procedure II, beginning in column 4). (The correct structures for the LCOs were provided in a Certificate of Correction.)

Stokkermans et al teach the utility of both synthetic and natural LCOs (p. 1588) for induction of root nodulation in legumes (soybean) at low concentration (abstract), and that LCOs may be derived from various rhizobial genera (*Bradyrhizobium*, *Rhizobium*, and *Azorhizobium*; p. 1587, 2<sup>nd</sup> para). The LCOs are disclosed as a group of bioactive sugar molecules that have been shown to regulate plant growth, development, and defense responses (p. 1593, 1<sup>st</sup> para); further, "LCOs have also been shown to have biological activities on nonleguminous plant cells, including induction of somatic embryo development in a mutant of carrot ... and alkalization of the growth medium by tomato cells". In the HAD assay (p. 1589-90), soybean seedlings were exposed to LCOs at  $10^{-8}$  M to about  $10^{-15}$  M.

Schlaman et al teach that LCO producing rhizobia may be used as a source of LCOs for legume root treatments (abstract).

Röhrig et al teach that LCOs also affect plant growth in nonleguminous plants (abstract).

One of ordinary skill in the art of photohormones would be motivated to combine these references because they disclose the utility of LCOs as phytohormones and investigate their applicability beyond the effects on leguminous roots on which their effects were first noted.

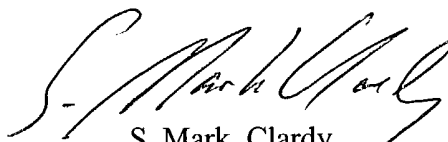
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Thus, it would have been *prima facie* obvious to the ordinary artisan at the time the invention was made to have applied LCOs to both leguminous and nonleguminous plants because the prior art teaches that they were known phytohormones with activities directed to both classes of plants. The prior art teaches the application of LCOs, or rhizobial species which produce LCOs, to seedlings or plants; it is inconsequential what the results of such applications would be, or whether such results were noted in the prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Mark Clardy whose telephone number is 571-272-0611. The examiner can normally be reached on 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Kunz can be reached on 571-272-0887. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Mark Clardy  
Primary Examiner  
Art Unit 1616

November 9, 2004